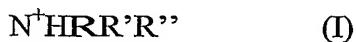


CLAIMS

1. An ionic liquid comprising an anion and a cation characterised in that the cation is a nitrogen-containing cation of the formula (I)



in which R is a hydrocarbyl group optionally substituted with by one or more substituents selected from nitrogen-containing functional groups (including nitrile, nitro or amino or another basic nitrogen-containing functional group), thiol, alkythio, sulphonyl, thiocyanate, isothiocyanate, azido, hydrazino, halogen, alkyl optionally interrupted by one or more ether or thioether linkages, alkoxy, alkenyl, hydroxy, carbonyl (including aldehyde or ketone), carboxyl, boronate, silyl and substituted amino (e.g. mono- or di-alkylamino or alkyamido); and

R' and R'', which may be the same or different, each represent H or R;

or any two or three of R, R' and R'' may be joined together with the N to form a cyclic group.

2. An ionic liquid as claimed in claim 1 wherein R' and R'' are H.
3. An ionic liquid as claimed in claim 1 wherein R' and R'' are different and have the same meaning as R.
4. An ionic liquid as claimed in claim 1 wherein the ionic liquid consists of an anion and a cation as defined in claim 1.
5. An ionic liquid as claimed in claim 1 wherein the cyclic group is a cyclohydrocarbyl or heterocyclyl group.

6. An ionic liquid as claimed in claim 5 wherein the cyclic group is not aryl or heteroaryl.
7. An ionic liquid as claimed in claim 1 wherein R is substituted with a moiety selected from the group consisting of alkenyl, hydroxyl, amino, thio, carbonyl and carboxyl groups.
8. An ionic liquid as claimed in claim 7 wherein R is substituted with a hydroxyl or amino group.
9. An ionic liquid as claimed in claim 1 wherein R is a hydroxyalkyl group having 1, 2, 3, 4, 5 or 6 C atoms.
10. An ionic liquid as claimed in claim 9 wherein the hydroxyalkyl group has a hydroxyl moiety on its free, terminal carbon.
11. An ionic liquid as claimed in claim 9 or 10 wherein R is a polyol having 2 to 6 C atoms.
12. An ionic liquid as claimed in claim 11 wherein R is a di-alkanol, tri-alkanol or tetra-alkanol group.
13. An ionic liquid as claimed in claim 12 wherein the cation is an ethanolammonium, N-(alkoxyethyl)ammonium, N-methylethanolammonium, N,N-dimethylethanolammonium, diethanolammonium, N-alkyldiethanolammonium, N,N-di(alkoxyalkyl)ammonium or triethanolammonium ion.
14. An ionic liquid as claimed in claim 13 wherein the cation is a methylethanolammonium, N,N-dimethylethanolammonium, N, N-di(methoxyethyl)ammonium or butyldiethanolammonium ion.

15. An ionic liquid as claimed in claim 1 wherein R is an aminoalkyl group having 2 to 8 C atoms
16. An ionic liquid as claimed in claim 15 wherein the aminoalkyl is a di or tri-aminoalkyl group.
17. An ionic liquid as claimed in claim 1 wherein R is putrescine, piperidine or tropine.
18. An ionic liquid as claimed in claim 1 wherein the cation is selected from the group consisting of an ethanolammonium, diethanolammonium, N-butyldiethanolammonium, N-methylethanolammonium, N,N-dimethylethanolammonium, putrescinium, 1-(3-hydroxypropyl)putrescinium, or N-(3-hydroxypropyl)-N-methylcyclohexylammonium cation.
19. An ionic liquid as claimed in claim 18 wherein the cation is N-butyldiethanolammonium, N-methylethanolammonium, di(methoxyethyl)ammonium, N,N-dimethylethanolammonium, putrescinium, 1-(3-hydroxypropyl)putrescinium, or N-(3-hydroxypropyl)-N-methylcyclohexylammonium ion.
20. An ionic liquid as claimed in claim 1 wherein the anion is selected from the group consisting of halogenated inorganic anions, nitrates, sulphates, phosphates, carbonates, sulphonates and carboxylates.
21. An ionic liquid as claimed in claim 20 wherein the sulphonates and carboxylates are alkylsulphonates and alkylcarboxylates respectively.
22. An ionic liquid as claimed in claim 21 wherein the alkyl group is a moiety selected from alkyl and alkyl substituted at any position with alkenyl, alkoxy,

alkeneoxy, aryl, arylalkyl, aryloxy, amino, aminoalkyl, thio, thioalkyl, hydroxyl, hydroxyalkyl, carbonyl, oxoalkyl, carboxyl, carboxyalkyl or halide function.

23. An ionic liquid as claimed in claim 1 wherein the anion is selected from bis(trifluoromethylsulphonyl)imide, carbonate, hydrogen carbonate, sulphate, hydrogen sulphate, silicate, phosphate, hydrogen phosphate, dihydrogen phosphate, metaphosphate, methanesulphonate, trifluoromethanesulphonate, ethylenediaminetetraacetate, chloride, bromide, iodide, hexafluorophosphate, tetrafluoroborate, trifluoroacetate, pentafluoropropanoate, heptafluorobutanoate, oxalate, formate, acetate, propanoate, butanoate, pentanoate, hexanoate, heptanoate, octanoate, nonanoate, decanoate, benzoate, benzenedicarboxylate, benzenetricarboxylate, benzenetetracarboxylate, chlorobenzoate, fluorobenzoate, pentachlorobenzoate, pentafluorobenzoate salicylate, glycolate lactate, pantothenate, tartrate, hydrogen tartrate, mandelate, crotonate, malate, pyruvate, succinate, citrate, fumarate, phenylacetate

24. An ionic liquid as claimed in claim 23 wherein the anion is an organic carboxylate.

25. An ionic liquid as claimed in claim 1 wherein the ionic liquid is selected from the group consisting of:

Ethanolammonium formate
Ethanolammonium acetate
Ethanolammonium propanoate
Ethanolammonium propanedioate
Ethanolammonium butanoate
Ethanolammonium butenoate
Ethanolammonium butanedioate
Ethanolammonium pentanoate
Ethanolammonium pentanedioate

Ethanolammonium pentenoate
Ethanolammonium hexanoate
Ethanolammonium hexanedioate
Ethanolammonium hexenoate
Ethanolammonium heptanoate
Ethanolammonium heptanedioate
Ethanolammonium heptenoate
Ethanolammonium octanoate
Ethanolammonium octanedioate
Ethanolammonium octenoate
Ethanolammonium nonanoate
Ethanolammonium nonanedioate
Ethanolammonium nonenoate
Ethanolammonium decanoate
Ethanolammonium decanedioate
Ethanolammonium decenoate
Ethanolammonium undecanoate
Ethanolammonium undecanedioate
Ethanolammonium undecenoate
Ethanolammonium dodecanoate
Ethanolammonium dodecanedicarboxylate
Ethanolammonium dodecenecarboxylate
Ethanolammonium cyclohexanecarboxylate
Ethanolammonium cyclohexenecarboxylate
Ethanolammonium phenoxide
Ethanolammonium benzoate
Ethanolammonium benzenedicarboxylate
Ethanolammonium benzenetricarboxylate
Ethanolammonium benzenetetracarboxylate
Ethanolammonium chlorobenzoate
Ethanolammonium fluorobenzoate

Ethanolammonium pentachlorobenzoate
Ethanolammonium pentafluorobenzoate
Ethanolammonium salicylate
Ethanolammonium glycolate
Ethanolammonium lactate
Ethanolammonium pantothenate
Ethanolammonium tartrate
Ethanolammonium hydrogen tartrate
Ethanolammonium mandelate
Ethanolammonium crotonate
Ethanolammonium malate
Ethanolammonium pyruvate
Ethanolammonium succinate
Ethanolammonium citrate
Ethanolammonium fumarate
Ethanolammonium phenylacetate
Ethanolammonium oxalate
Ethanolammonium bis(trifluoromethylsulphonyl)imide
Ethanolammonium carbonate
Ethanolammonium hydrogen carbonate
Ethanolammonium sulphate
Ethanolammonium hydrogen sulphate
Ethanolammonium phosphate
Ethanolammonium hydrogen phosphate
Ethanolammonium dihydrogen phosphate
Ethanolammonium methanesulfonate
Ethanolammonium trifluoromethanesulphonate
Ethanolammonium ethylenediaminetetraacetate
Ethanolammonium hexafluorophosphate
Ethanolammonium tetrafluoroborate
Ethanolammonium trifluoroacetate

Ethanolammonium pentafluoropropanoate
Ethanolammonium heptafluorobutanoate
Ethanolammonium phosphoenolpyruvate
Ethanolammonium nicotinamide adenine dinucleotide phosphate
Ethanolammonium adenosinephosphate
Ethanolammonium adenosine diphosphate
Ethanolammonium adenosine triphosphate
Ethanolammonium oxyniacate
Ethanolammonium nitrate
Ethanolammonium nitrite
Diethanolammonium bromide
Diethanolammonium iodide
Diethanolammonium formate
Diethanolammonium acetate
Diethanolammonium propanoate
Diethanolammonium propanedioate
Diethanolammonium butanoate
Diethanolammonium butenoate
Diethanolammonium butanedioate
Diethanolammonium pentanoate
Diethanolammonium pentanedioate
Diethanolammonium pentenoate
Diethanolammonium hexanoate
Diethanolammonium hexanedioate
Diethanolammonium hexenoate
Diethanolammonium heptanoate
Diethanolammonium heptanedioate
Diethanolammonium heptenoate
Diethanolammonium octanoate
Diethanolammonium octanedioate
Diethanolammonium octenoate

Diethanolammonium nonanoate
Diethanolammonium nonanedioate
Diethanolammonium nonenoate
Diethanolammonium decanoate
Diethanolammonium decanedioate
Diethanolammonium decenoate
Diethanolammonium undecanoate
Diethanolammonium undecanedioate
Diethanolammonium undecenoate
Diethanolammonium dodecanoate
Diethanolammonium dodecanedicarboxylate
Diethanolammonium dodecenecarboxylate
Diethanolammonium cyclohexanecarboxylate
Diethanolammonium cyclohexenecarboxylate
Diethanolammonium phenoxide
Diethanolammonium benzoate
Diethanolammonium benzenedicarboxylate
Diethanolammonium benzenetricarboxylate
Diethanolammonium benzenetetracarboxylate
Diethanolammonium chlorobenzoate
Diethanolammonium fluorobenzoate
Diethanolammonium pentachlorobenzoate
Diethanolammonium pentafluorobenzoate
Diethanolammonium salicylate
Diethanolammonium glycolate
Diethanolammonium lactate
Diethanolammonium pantothenate
Diethanolammonium tartrate
Diethanolammonium hydrogen tartrate
Diethanolammonium mandelate
Diethanolammonium crotonate

Diethanolammonium malate
Diethanolammonium pyruvate
Diethanolammonium succinate
Diethanolammonium citrate
Diethanolammonium fumarate
Diethanolammonium phenylacetate
Diethanolammonium oxalate
Diethanolammonium bis(trifluoromethylsulphonyl)imide
Diethanolammonium carbonate
Diethanolammonium hydrogen carbonate
Diethanolammonium phosphate
Diethanolammonium hydrogen phosphate
Diethanolammonium dihydrogen phosphate
Diethanolammonium methanesulphonate
Diethanolammonium trifluoromethanesulphonate
Diethanolammonium ethylenediaminetetraacetate
Diethanolammonium hexafluorophosphate
Diethanolammonium tetrafluoroborate
Diethanolammonium trifluoroacetate
Diethanolammonium pentafluoropropanoate
Diethanolammonium heptafluorobutanoate
Diethanolammonium phosphoenolpyruvate
Diethanolammonium nicotinamide adenine dinucleotide phosphate
Diethanolammonium adenosinephosphate
Diethanolammonium adenosine diphosphate
Diethanolammonium adenosine triphosphate
Diethanolammonium oxyriacate
Diethanolammonium nitrate
Diethanolammonium nitrite
N-Butyldiethanolammonium chloride
N-Butyldiethanolammonium bromide

N-Butyldiethanolammonium iodide
N-Butyldiethanolammonium formate
N-Butyldiethanolammonium acetate
N-Butyldiethanolammonium propanoate
N-Butyldiethanolammonium propanedioate
N-Butyldiethanolammonium butanoate
N-Butyldiethanolammonium butenoate
N-Butyldiethanolammonium butanedioate
N-Butyldiethanolammonium pentanoate
N-Butyldiethanolammonium pentanedioate
N-Butyldiethanolammonium pentenoate
N-Butyldiethanolammonium hexanoate
N-Butyldiethanolammonium hexenoate
N-Butyldiethanolammonium heptanoate
N-Butyldiethanolammonium heptanedioate
N-Butyldiethanolammonium heptenoate
N-Butyldiethanolammonium octanoate
N-Butyldiethanolammonium octanedioate
N-Butyldiethanolammonium octenoate
N-Butyldiethanolammonium nonanoate
N-Butyldiethanolammonium nonanedioate
N-Butyldiethanolammonium nonenoate
N-Butyldiethanolammonium decanoate
N-Butyldiethanolammonium decanedioate
N-Butyldiethanolammonium decenoate
N-Butyldiethanolammonium undecanoate
N-Butyldiethanolammonium undecanedioate
N-Butyldiethanolammonium undecenoate
N-Butyldiethanolammonium dodecanoate
N-Butyldiethanolammonium dodecanedicarboxylate
N-Butyldiethanolammonium dodecenecarboxylate

N-Butyldiethanolammonium cyclohexanecarboxylate
N-Butyldiethanolammonium cyclohexenecarboxylate
N-Butyldiethanolammonium phenoxide
N-Butyldiethanolammonium benzoate
N-Butyldiethanolammonium benzenededicarboxylate
N-Butyldiethanolammonium benzenetricarboxylate
N-Butyldiethanolammonium benzenetetracarboxylate
N-Butyldiethanolammonium chlorobenzoate
N-Butyldiethanolammonium fluorobenzoate
N-Butyldiethanolammonium pentachlorobenzoate
N-Butyldiethanolammonium pentafluorobenzoate
N-Butyldiethanolammonium salicylate
N-Butyldiethanolammonium glycolate
N-Butyldiethanolammonium lactate
N-Butyldiethanolammonium pantothenate
N-Butyldiethanolammonium tartrate
N-Butyldiethanolammonium hydrogen tartrate
N-Butyldiethanolammonium mandelate
N-Butyldiethanolammonium crotonate
N-Butyldiethanolammonium malate
N-Butyldiethanolammonium pyruvate
N-Butyldiethanolammonium succinate
N-Butyldiethanolammonium citrate
N-Butyldiethanolammonium fumarate
N-Butyldiethanolammonium phenylacetate
N-Butyldiethanolammonium oxalate
N-Butyldiethanolammonium bis(trifluoromethylsulphonyl)imide
N-Butyldiethanolammonium carbonate
N-Butyldiethanolammonium hydrogen carbonate
N-Butyldiethanolammonium sulphate
N-Butyldiethanolammonium hydrogen sulphate

N-Butyldiethanolammonium phosphate
N-Butyldiethanolammonium hydrogen phosphate
N-Butyldiethanolammonium dihydrogen phosphate
N-Butyldiethanolammonium methanesulphonate
N-Butyldiethanolammonium trifluoromethanesulphonate
N-Butyldiethanolammonium ethylenediaminetetraacetate
N-Butyldiethanolammonium hexafluorophosphate
N-Butyldiethanolammonium tetrafluoroborate
N-Butyldiethanolammonium trifluoroacetate
N-Butyldiethanolammonium pentafluoropropanoate
N-Butyldiethanolammonium heptafluorobutanoate
N-Butyldiethanolammonium phosphoenolpyruvate
N-Butyldiethanolammonium nicotinamide adenine dinucleotide phosphate
N-Butyldiethanolammonium adenosinephosphate
N-Butyldiethanolammonium adenosine diphosphate
N-Butyldiethanolammonium adenosine triphosphate
N-Butyldiethanolammonium oxyniacate
N-Butyldiethanolammonium nitrate
N-Butyldiethanolammonium nitrite
N,N-Dimethylethanolammonium bromide
N,N-Dimethylethanolammonium iodide
N,N-Dimethylethanolammonium formate
N,N-Dimethylethanolammonium acetate
N,N-Dimethylethanolammonium propanoate
N,N-Dimethylethanolammonium propanedioate
N,N-Dimethylethanolammonium butanoate
N,N-Dimethylethanolammonium butenoate
N,N-Dimethylethanolammonium butanedioate
N,N-Dimethylethanolammonium pentanoate
N,N-Dimethylethanolammonium pentanedioate
N,N-Dimethylethanolammonium pentenoate

N,N-Dimethylethanolammonium hexanoate
N,N-Dimethylethanolammonium hexenoate
N,N-Dimethylethanolammonium heptanoate
N,N-Dimethylethanolammonium heptanedioate
N,N-Dimethylethanolammonium heptenoate
N,N-Dimethylethanolammonium octanoate
N,N-Dimethylethanolammonium octanedioate
N,N-Dimethylethanolammonium octenoate
N,N-Dimethylethanolammonium nonanoate
N,N-Dimethylethanolammonium nonanedioate
N,N-Dimethylethanolammonium nonenoate
N,N-Dimethylethanolammonium decanoate
N,N-Dimethylethanolammonium decanedioate
N,N-Dimethylethanolammonium decenoate
N,N-Dimethylethanolammonium undecanoate
N,N-Dimethylethanolammonium undecanedioate
N,N-Dimethylethanolammonium undecenoate
N,N-Dimethylethanolammonium dodecanoate
N,N-Dimethylethanolammonium dodecanedicarboxylate
N,N-Dimethylethanolammonium dodecenecarboxylate
N,N-Dimethylethanolammonium cyclohexanecarboxylate
N,N-Dimethylethanolammonium cyclohexenecarboxylate
N,N-Dimethylethanolammonium phenoxide
N,N-Dimethylethanolammonium benzoate
N,N-Dimethylethanolammonium benzeneedicarboxylate
N,N-Dimethylethanolammonium benzenetricarboxylate
N,N-Dimethylethanolammonium benzenetetracarboxylate
N,N-Dimethylethanolammonium chlorobenzoate
N,N-Dimethylethanolammonium fluorobenzoate
N,N-Dimethylethanolammonium pentachlorobenzoate
N,N-Dimethylethanolammonium pentafluorobenzoate

N,N-Dimethylethanolammonium salicylate
N,N-Dimethylethanolammonium glycolate
N,N-Dimethylethanolammonium lactate
N,N-Dimethylethanolammonium pantothenate
N,N-Dimethylethanolammonium tartrate
N,N-Dimethylethanolammonium hydrogen tartrate
N,N-Dimethylethanolammonium mandelate
N,N-Dimethylethanolammonium crotonate
N,N-Dimethylethanolammonium malate
N,N-Dimethylethanolammonium pyruvate
N,N-Dimethylethanolammonium succinate
N,N-Dimethylethanolammonium citrate
N,N-Dimethylethanolammonium fumarate
N,N-Dimethylethanolammonium phenylacetate
N,N-Dimethylethanolammonium oxalate
N,N-Dimethylethanolammonium bis(trifluoromethylsulphonyl)imide
N,N-Dimethylethanolammonium carbonate
N,N-Dimethylethanolammonium hydrogen carbonate
N,N-Dimethylethanolammonium sulphate
N,N-Dimethylethanolammonium hydrogen sulphate
N,N-Dimethylethanolammonium phosphate
N,N-Dimethylethanolammonium hydrogen phosphate
N,N-Dimethylethanolammonium dihydrogen phosphate
N,N-Dimethylethanolammonium methanesulphonate
N,N-Dimethylethanolammonium trifluoromethanesulphonate
N,N-Dimethylethanolammonium ethylenediaminetetraacetate
N,N-Dimethylethanolammonium hexafluorophosphate
N,N-Dimethylethanolammonium tetrafluoroborate
N,N-Dimethylethanolammonium trifluoroacetate
N,N-Dimethylethanolammonium pentafluoropropanoate
N,N-Dimethylethanolammonium heptafluorobutanoate

N,N-Dimethylethanolammonium phosphoenolpyruvate
N,N-Dimethylethanolammonium nicotinamide adenine dinucleotide phosphate
N,N-Dimethylethanolammonium adenosinephosphate
N,N-Dimethylethanolammonium adenosine diphosphate
N,N-Dimethylethanolammonium adenosine triphosphate
N,N-Dimethylethanolammonium oxyniacate
N,N-Dimethylethanolammonium nitrate
N,N-Dimethylethanolammonium nitrite
N-Methylethanolammonium bromide
N-Methylethanolammonium iodide
N-Methylethanolammonium formate
N-Methylethanolammonium acetate
N-Methylethanolammonium propanoate
N-Methylethanolammonium propanedioate
N-Methylethanolammonium butanoate
N-Methylethanolammonium butenoate
N-Methylethanolammonium butanedioate
N-Methylethanolammonium pentanoate
N-Methylethanolammonium pentanedioate
N-Methylethanolammonium pentenoate
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N-Methylethanolammonium hexenoate
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N-Methylethanolammonium heptanedioate
N-Methylethanolammonium heptenoate
N-Methylethanolammonium octanoate
N-Methylethanolammonium octanedioate
N-Methylethanolammonium octenoate
N-Methylethanolammonium nonanoate
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N-Methylethanolammonium nonenoate

N-Methylethanolammonium decanoate
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N-Methylethanolammonium undecanoate
N-Methylethanolammonium undecanedioate
N-Methylethanolammonium undecenoate
N-Methylethanolammonium dodecanoate
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N-Methylethanolammonium dodecenecarboxylate
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N-Methylethanolammonium cyclohexenecarboxylate
N-Methylethanolammonium phenoxide
N-Methylethanolammonium benzoate
N-Methylethanolammonium benzenedicarboxylate
N-Methylethanolammonium benzenetricarboxylate
N-Methylethanolammonium benzenetetracarboxylate
N-Methylethanolammonium chlorobenzoate
N-Methylethanolammonium fluorobenzoate
N-Methylethanolammonium pentachlorobenzoate
N-Methylethanolammonium pentafluorobenzoate
N-Methylethanolammonium salicylate
N-Methylethanolammonium glycolate
N-Methylethanolammonium lactate
N-Methylethanolammonium pantothenate
N-Methylethanolammonium tartrate
N-Methylethanolammonium hydrogen tartrate
N-Methylethanolammonium mandelate
N-Methylethanolammonium crotonate
N-Methylethanolammonium malate
N-Methylethanolammonium pyruvate
N-Methylethanolammonium succinate

N-Methylethanolammonium citrate
N-Methylethanolammonium fumarate
N-Methylethanolammonium phenylacetate
N-Methylethanolammonium oxalate
N-Methylethanolammonium bis(trifluoromethylsulphonyl)imide
N-Methylethanolammonium carbonate
N-Methylethanolammonium hydrogen carbonate
N-Methylethanolammonium sulphate
N-Methylethanolammonium hydrogen sulphate
N-Methylethanolammonium phosphate
N-Methylethanolammonium hydrogen phosphate
N-Methylethanolammonium dihydrogen phosphate
N-Methylethanolammonium methanesulphonate
N-Methylethanolammonium trifluoromethanesulphonate
N-Methylethanolammonium ethylenediaminetetraacetate
N-Methylethanolammonium hexafluorophosphate
N-Methylethanolammonium tetrafluoroborate
N-Methylethanolammonium trifluoroacetate
N-Methylethanolammonium pentafluoropropanoate
N-Methylethanolammonium heptafluorobutanoate
N-Methylethanolammonium phosphoenolpyruvate
N-Methylethanolammonium nicotinamide adenine dinucleotide phosphate
N-Methylethanolammonium adenosinephosphate
N-Methylethanolammonium adenosine diphosphate
N-Methylethanolammonium adenosine triphosphate
N-Methylethanolammonium oxyriacate
N-Methylethanolammonium nitrate
N-Methylethanolammonium nitrite
N,N-Di(methoxyethyl)ammonium chloride
N,N-Di(methoxyethyl)ammonium bromide
N,N-Di(methoxyethyl)ammonium iodide

N,N-Di(methoxyethyl)ammonium formate
N,N-Di(methoxyethyl)ammonium acetate
N,N-Di(methoxyethyl)ammonium propanoate
N,N-Di(methoxyethyl)ammonium propanedioate
N,N-Di(methoxyethyl)ammonium butanoate
N,N-Di(methoxyethyl)ammonium butenoate
N,N-Di(methoxyethyl)ammonium butanedioate
N,N-Di(methoxyethyl)ammonium pentanoate
N,N-Di(methoxyethyl)ammonium pentanedioate
N,N-Di(methoxyethyl)ammonium pentenoate
N,N-Di(methoxyethyl)ammonium hexanoate
N,N-Di(methoxyethyl)ammonium hexenoate
N,N-Di(methoxyethyl)ammonium heptanoate
N,N-Di(methoxyethyl)ammonium heptanedioate
N,N-Di(methoxyethyl)ammonium heptenoate
N,N-Di(methoxyethyl)ammonium octanoate
N,N-Di(methoxyethyl)ammonium octanedioate
N,N-Di(methoxyethyl)ammonium octenoate
N,N-Di(methoxyethyl)ammonium nonanoate
N,N-Di(methoxyethyl)ammonium nonanedioate
N,N-Di(methoxyethyl)ammonium nonenoate
N,N-Di(methoxyethyl)ammonium decanoate
N,N-Di(methoxyethyl)ammonium decanedioate
N,N-Di(methoxyethyl)ammonium decenoate
N,N-Di(methoxyethyl)ammonium undecanoate
N,N-Di(methoxyethyl)ammonium undecanedioate
N,N-Di(methoxyethyl)ammonium undecenoate
N,N-Di(methoxyethyl)ammonium dodecanoate
N,N-Di(methoxyethyl)ammonium dodecanedicarboxylate
N,N-Di(methoxyethyl)ammonium dodecenecarboxylate
N,N-Di(methoxyethyl)ammonium cyclohexanecarboxylate

N,N-Di(methoxyethyl)ammonium cyclohexenecarboxylate
N,N-Di(methoxyethyl)ammonium phenoxide
N,N-Di(methoxyethyl)ammonium benzoate
N,N-Di(methoxyethyl)ammonium benzenedicarboxylate
N,N-Di(methoxyethyl)ammonium benzenetricarboxylate
N,N-Di(methoxyethyl)ammonium benzenetetracarboxylate
N,N-Di(methoxyethyl)ammonium chlorobenzoate
N,N-Di(methoxyethyl)ammonium fluorobenzoate
N,N-Di(methoxyethyl)ammonium pentachlorobenzoate
N,N-Di(methoxyethyl)ammonium pentafluorobenzoate
N,N-Di(methoxyethyl)ammonium salicylate
N,N-Di(methoxyethyl)ammonium glycolate
N,N-Di(methoxyethyl)ammonium lactate
N,N-Di(methoxyethyl)ammonium pantothenate
N,N-Di(methoxyethyl)ammonium tartrate
N,N-Di(methoxyethyl)ammonium hydrogen tartrate
N,N-Di(methoxyethyl)ammonium mandelate
N,N-Di(methoxyethyl)ammonium crotonate
N,N-Di(methoxyethyl)ammonium malate
N,N-Di(methoxyethyl)ammonium pyruvate
N,N-Di(methoxyethyl)ammonium succinate
N,N-Di(methoxyethyl)ammonium citrate
N,N-Di(methoxyethyl)ammonium fumarate
N,N-Di(methoxyethyl)ammonium phenylacetate
N,N-Di(methoxyethyl)ammonium oxalate
N,N-Di(methoxyethyl)ammonium bis(trifluoromethylsulphonyl)imide
N,N-Di(methoxyethyl)ammonium carbonate
N,N-Di(methoxyethyl)ammonium hydrogen carbonate
N,N-Di(methoxyethyl)ammonium sulphate
N,N-Di(methoxyethyl)ammonium hydrogen sulphate
N,N-Di(methoxyethyl)ammonium phosphate

N,N-Di(methoxyethyl)ammonium hydrogen phosphate
N,N-Di(methoxyethyl)ammonium dihydrogen phosphate
N,N-Di(methoxyethyl)ammonium methanesulphonate
N,N-Di(methoxyethyl)ammonium trifluoromethanesulphonate
N,N-Di(methoxyethyl)ammonium ethylenediaminetetraacetate
N,N-Di(methoxyethyl)ammonium hexafluorophosphate
N,N-Di(methoxyethyl)ammonium tetrafluoroborate
N,N-Di(methoxyethyl)ammonium trifluoroacetate
N,N-Di(methoxyethyl)ammonium pentafluoropropionate
N,N-Di(methoxyethyl)ammonium heptafluorobutanoate
N,N-Di(methoxyethyl)ammonium phosphoenolpyruvate
N,N-Di(methoxyethyl)ammonium nicotinamide adenine dinucleotide phosphate
N,N-Di(methoxyethyl)ammonium adenosinephosphate
N,N-Di(methoxyethyl)ammonium adenosine diphosphate
N,N-Di(methoxyethyl)ammonium adenosine triphosphate
N,N-Di(methoxyethyl)ammonium oxyniacate
N,N-Di(methoxyethyl)ammonium nitrate
N,N-Di(methoxyethyl)ammonium nitrite1-(3-Hydroxypropyl)putrescinium chloride
1-(3-Hydroxypropyl)putrescinium bromide
1-(3-Hydroxypropyl)putrescinium iodide
1-(3-Hydroxypropyl)putrescinium formate
1-(3-Hydroxypropyl)putrescinium acetate
1-(3-Hydroxypropyl)putrescinium propanoate
1-(3-Hydroxypropyl)putrescinium propanedioate
1-(3-Hydroxypropyl)putrescinium butanoate
1-(3-Hydroxypropyl)putrescinium butenoate
1-(3-Hydroxypropyl)putrescinium butanedioate
1-(3-Hydroxypropyl)putrescinium pentanoate
1-(3-Hydroxypropyl)putrescinium pentanedioate
1-(3-Hydroxypropyl)putrescinium pentenoate
1-(3-Hydroxypropyl)putrescinium hexanoate

1-(3-Hydroxypropyl)putrescinium hexenoate
1-(3-Hydroxypropyl)putrescinium heptanoate
1-(3-Hydroxypropyl)putrescinium heptanedioate
1-(3-Hydroxypropyl)putrescinium heptenoate
1-(3-Hydroxypropyl)putrescinium octanoate
1-(3-Hydroxypropyl)putrescinium octanedioate
1-(3-Hydroxypropyl)putrescinium octenoate
1-(3-Hydroxypropyl)putrescinium nonanoate
1-(3-Hydroxypropyl)putrescinium nonanedioate
1-(3-Hydroxypropyl)putrescinium nonenoate
1-(3-Hydroxypropyl)putrescinium decanoate
1-(3-Hydroxypropyl)putrescinium decanedioate
1-(3-Hydroxypropyl)putrescinium decenoate
1-(3-Hydroxypropyl)putrescinium undecanoate
1-(3-Hydroxypropyl)putrescinium undecanedioate
1-(3-Hydroxypropyl)putrescinium undecenoate
1-(3-Hydroxypropyl)putrescinium dodecanoate
1-(3-Hydroxypropyl)putrescinium dodecanedicarboxylate
1-(3-Hydroxypropyl)putrescinium dodecenecarboxylate
1-(3-Hydroxypropyl)putrescinium cyclohexanecarboxylate
1-(3-Hydroxypropyl)putrescinium cyclohexenecarboxylate
1-(3-Hydroxypropyl)putrescinium phenoxide
1-(3-Hydroxypropyl)putrescinium benzoate
1-(3-Hydroxypropyl)putrescinium benzenedicarboxylate
1-(3-Hydroxypropyl)putrescinium benzenetricarboxylate
1-(3-Hydroxypropyl)putrescinium benzenetetracarboxylate
1-(3-Hydroxypropyl)putrescinium chlorobenzoate
1-(3-Hydroxypropyl)putrescinium fluorobenzoate
1-(3-Hydroxypropyl)putrescinium pentachlorobenzoate
1-(3-Hydroxypropyl)putrescinium pentafluorobenzoate
1-(3-Hydroxypropyl)putrescinium salicylate

1-(3-Hydroxypropyl)putrescinium glycolate
1-(3-Hydroxypropyl)putrescinium lactate
1-(3-Hydroxypropyl)putrescinium pantothenate
1-(3-Hydroxypropyl)putrescinium tartrate
1-(3-Hydroxypropyl)putrescinium hydrogen tartrate
1-(3-Hydroxypropyl)putrescinium mandelate
1-(3-Hydroxypropyl)putrescinium crotonate
1-(3-Hydroxypropyl)putrescinium malate
1-(3-Hydroxypropyl)putrescinium pyruvate
1-(3-Hydroxypropyl)putrescinium succinate
1-(3-Hydroxypropyl)putrescinium citrate
1-(3-Hydroxypropyl)putrescinium fumarate
1-(3-Hydroxypropyl)putrescinium phenylacetate
1-(3-Hydroxypropyl)putrescinium oxalate
1-(3-Hydroxypropyl)putrescinium bis(trifluoromethylsulphonyl)imide
1-(3-Hydroxypropyl)putrescinium methanesulphonate
1-(3-Hydroxypropyl)putrescinium trifluoromethanesulphonate
1-(3-Hydroxypropyl)putrescinium hexafluorophosphate
1-(3-Hydroxypropyl)putrescinium tetrafluoroborate
1-(3-Hydroxypropyl)putrescinium trifluoroacetate
1-(3-Hydroxypropyl)putrescinium pentafluoropropanoate
1-(3-Hydroxypropyl)putrescinium heptafluorobutanoate
1-(3-Hydroxypropyl)putrescinium phosphoenolpyruvate
1-(3-Hydroxypropyl)putrescinium nicotinamide adenine dinucleotide phosphate
1-(3-Hydroxypropyl)putrescinium adenosinephosphate
1-(3-Hydroxypropyl)putrescinium adenosine diphosphate
1-(3-Hydroxypropyl)putrescinium adenosine triphosphate
1-(3-Hydroxypropyl)putrescinium carbonate
1-(3-Hydroxypropyl)putrescinium hydrogen carbonate
1-(3-Hydroxypropyl)putrescinium sulphate
1-(3-Hydroxypropyl)putrescinium hydrogen sulphate

1-(3-Hydroxypropyl)putrescinium phosphate
1-(3-Hydroxypropyl)putrescinium hydrogen phosphate
1-(3-Hydroxypropyl)putrescinium dihydrogen phosphate
1-(3-Hydroxypropyl)putrescinium nitrate
1-(3-Hydroxypropyl)putrescinium nitrite

26. A process for the preparation of an ionic liquid as claimed in claim 1, the process comprising the steps of:

- i.) providing an organic primary, secondary or tertiary amine; and
- ii.) neutralising the compound in (i) with an acid.

27. A process as claimed in claim 26 which comprises the steps of:

- i.) providing a nitrogen-containing compound of the formula (II)



in which R is a hydrocarbyl group optionally substituted with by one or more substituents selected from nitrogen-containing functional groups (including nitrile, nitro or amino or another basic nitrogen-containing functional group), thiol, alkythio, sulphonyl, thiocyanate, isothiocyanate, azido, hydrazino, halogen, alkyl optionally interrupted by one or more ether or thioether linkages, alkoxy, alkenyl, hydroxy, carbonyl (including aldehyde or ketone), carboxyl, boronate, silyl and substituted amino (e.g. mono- or di-alkylaminó, or alkyamido); and

R' and R'', which may be the same or different, each represent H or R; or any two or three of R, R' and R'' may be joined together with the N to form a cyclic group.

- ii.) neutralising the compound in (i) with an acid.

28. A process as claimed in claim 26 or 27 wherein the acid includes an anion comprising a halogenated inorganic anion, nitrate, sulphate, carbonate, sulphonate or carboxylate.

29. The use of an ionic liquid comprising an anion and a cation wherein the cation is a primary, secondary or tertiary ammonium ion containing a protonated nitrogen atom as a solvent for enzyme-catalysed reactions, a solvent for organic synthesis, a matrix in matrix-assisted laser desorption/ionisation (MALDI) mass spectrometry, a solvent for extraction, in catalysis or liquefaction, nuclear fuel reprocessing medium, fuel cell, electrochemical applications, pervaporation, drug delivery lubrication, hydraulics, adhesives, sensors, biocides or chromatographic media.

30. The use as claimed in claim 29 wherein the cation is a nitrogen-containing cation of the formula (I)



in which R is a hydrocarbyl group optionally substituted with by one or more substituents selected from nitrogen-containing functional groups (including nitrile, nitro or amino or another basic nitrogen-containing functional group), thiol, alkythio, sulphonyl, thiocyanate, isothiocyanate, azido, hydrazino, halogen, alkyl optionally interrupted by one or more ether or thioether linkages, alkoxy, alkenyl, hydroxy, carbonyl (including aldehyde or ketone), carboxyl, boronate, silyl and substituted amino (e.g. mono- or di-alkylamino or alkyamido); and

R' and R'', which may be the same or different, each represent H or R; or any two or three of R, R' and R'' may be joined together with the N to form a cyclic group.

31. A method for carrying out an enzyme-catalysed reaction comprising

- i.) providing a liquid reaction medium which contains an ionic liquid comprising an anion and a cation wherein the cation is a primary, secondary or tertiary ammonium ion containing a protonated nitrogen atom;
- ii.) providing in the liquid reaction medium an enzyme and a substrate for the enzyme; and
- iii.) allowing reaction of the substrate to occur.